

# PATENT ABSTRACTS OF JAPAN

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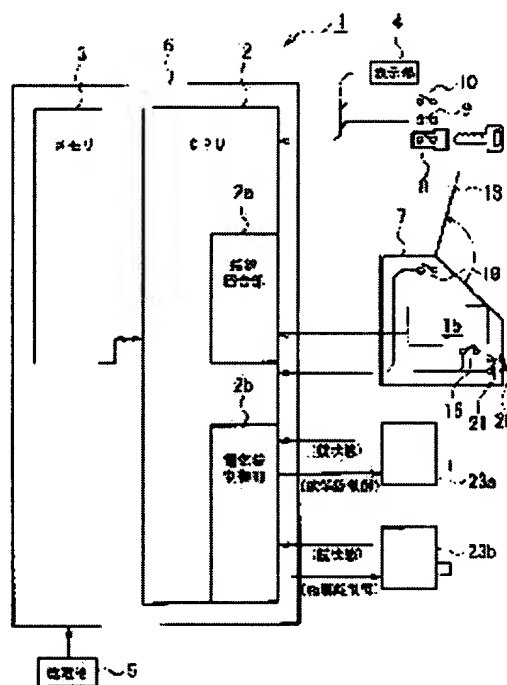
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## (54) FINGERPRINT LOCK

(57)Abstract:

**PROBLEM TO BE SOLVED:** To provide a fingerprint lock which can pick up an image of a fingerprint of a person to enter a room in a short time through a series of operations.

**SOLUTION:** The fingerprint lock is provided with a detecting window 11 on which a fingertip of the person to enter the room is mounted, and a cover is set for covering the detecting window 11. Further, a cover switch 19 for detecting whether the cover 13 is opened or closed, is provided for the cover 13. When the person to enter the room opens the cover 13 and the cover switch 19 is turned on, a power source of a fingerprint sensor 15 is turned on in response to a signal from the cover switch 19. A camera for picking up the image of the fingerprint is warmed up in about a few seconds, and therefore when the cover 13 is opened to mount the fingertip on the detection window 11, the warming-up of the camera 14 has been completed. As a result, the image pickup of the fingerprint by the camera 14 takes place in an instant.



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CLAIMS

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[Claim(s)]

[Claim 1] In the fingerprint lock which unlocks the electric lock formed in the door when an entrance person's fingerprint and the fingerprint registered beforehand are in agreement A fingerprint detection means by which an image pick-up means to picturize the fingerprint of the fingertip put on the detection aperture which is installed in the outside of said door and lays said entrance person's fingertip, and this detection aperture was provided, A fingerprint data storage means to memorize the fingerprint data registered beforehand, and the fingerprint data detected with said fingerprint detection means, The registered fingerprint data are collated and it has the control means which unlocks said electric lock when coincidence is checked. Said fingerprint detection means Furthermore, the fingerprint lock characterized by switching on the power source of said fingerprint detection means when what the switching means which detects what wrap covering and this covering opened said detection aperture for possible [ closing motion ] was carried, and covering opened in said switching means is detected.

[Claim 2] It is the fingerprint lock according to claim 1 which said covering has a hinge region, and revolution of it is enabled centering on this hinge region, and is characterized by said switching means being the mechanical switch formed near said hinge region.

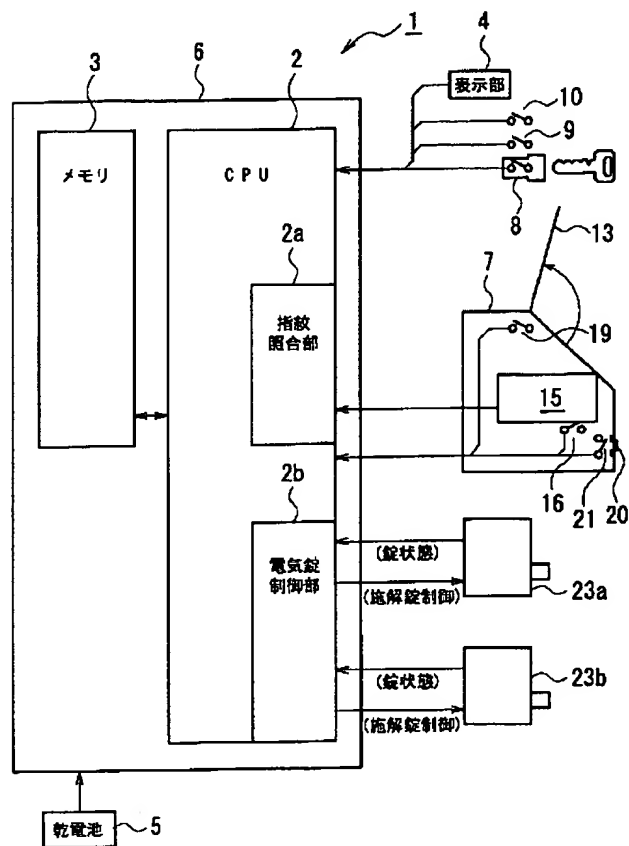
[Claim 3] Said fingerprint detection means is a fingerprint lock given in either claim 1 which the press of is enabled caudad and characterized by installing a finger presser-foot switch, detecting that this finger presser-foot switch was thrown in under this fingerprint detection means, and starting the image pick-up by said image pick-up means, or claim 2.

[Claim 4] It is a fingerprint lock given in any 1 term of claim 1 to which it has a lock switch for locking said electric lock from the outside of said door, and said control means is characterized by controlling in order to switch on the power source of said fingerprint detection means when the electric lock is locked and a lock switch is thrown in - claim 3.

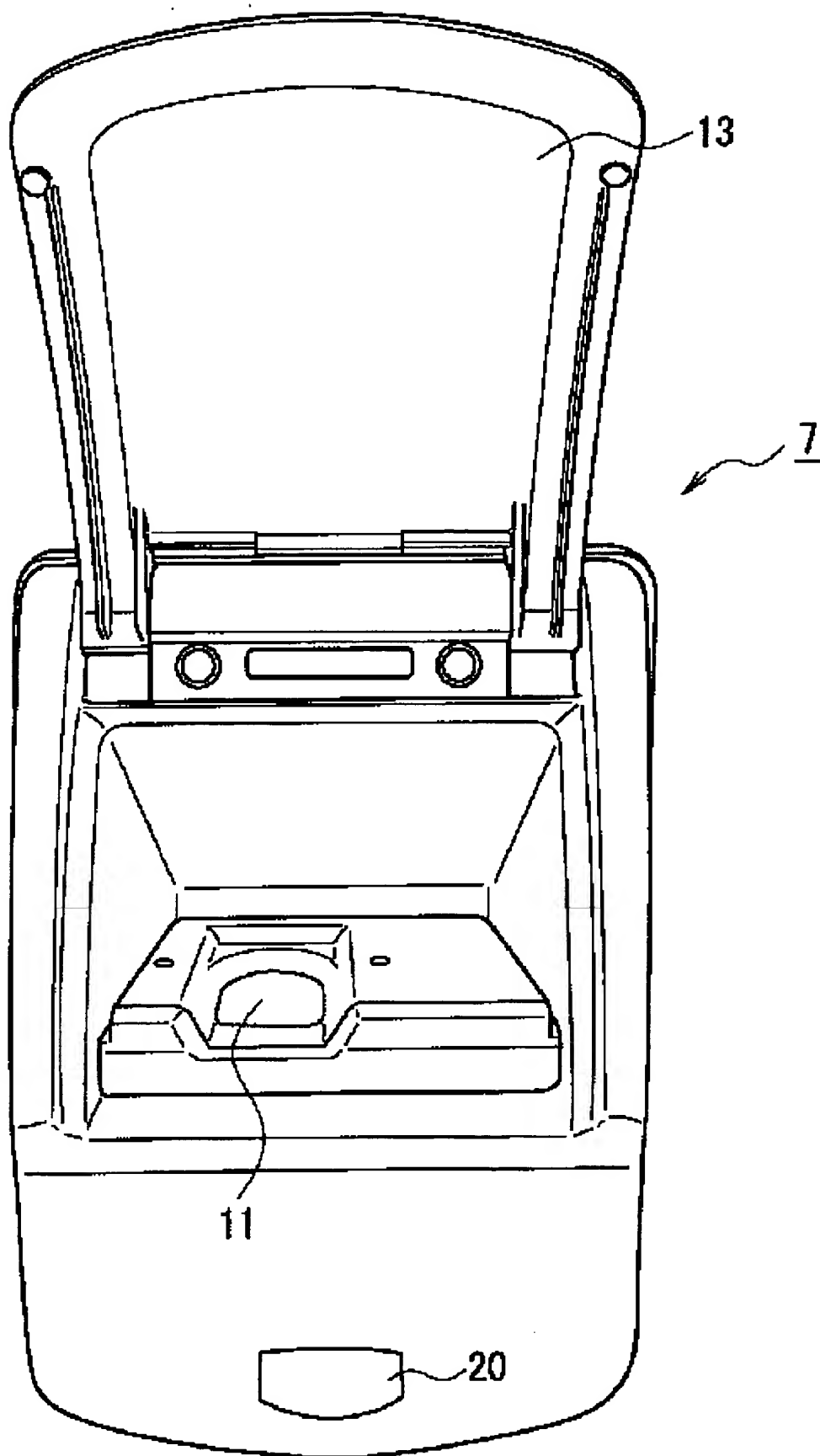
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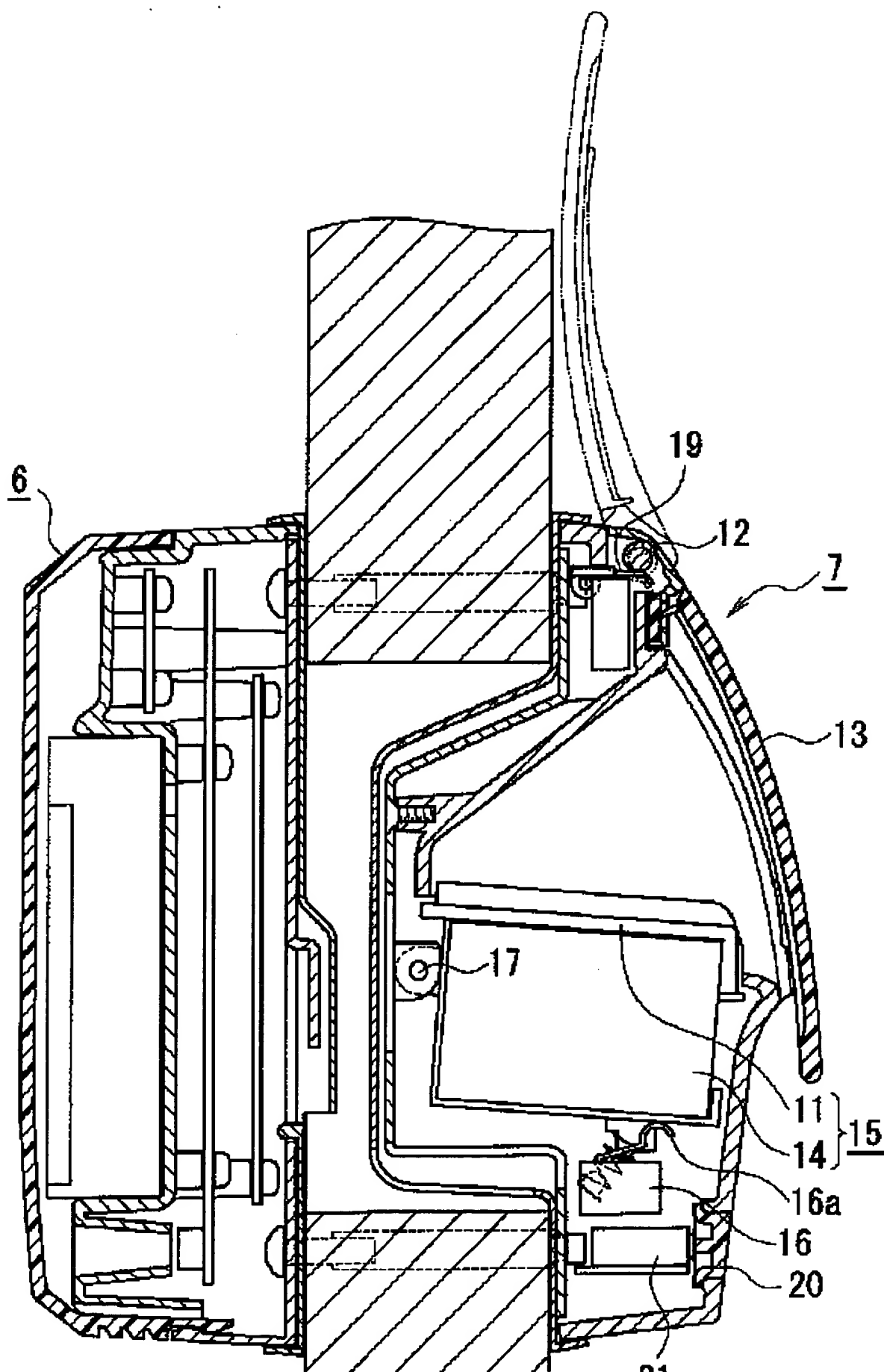
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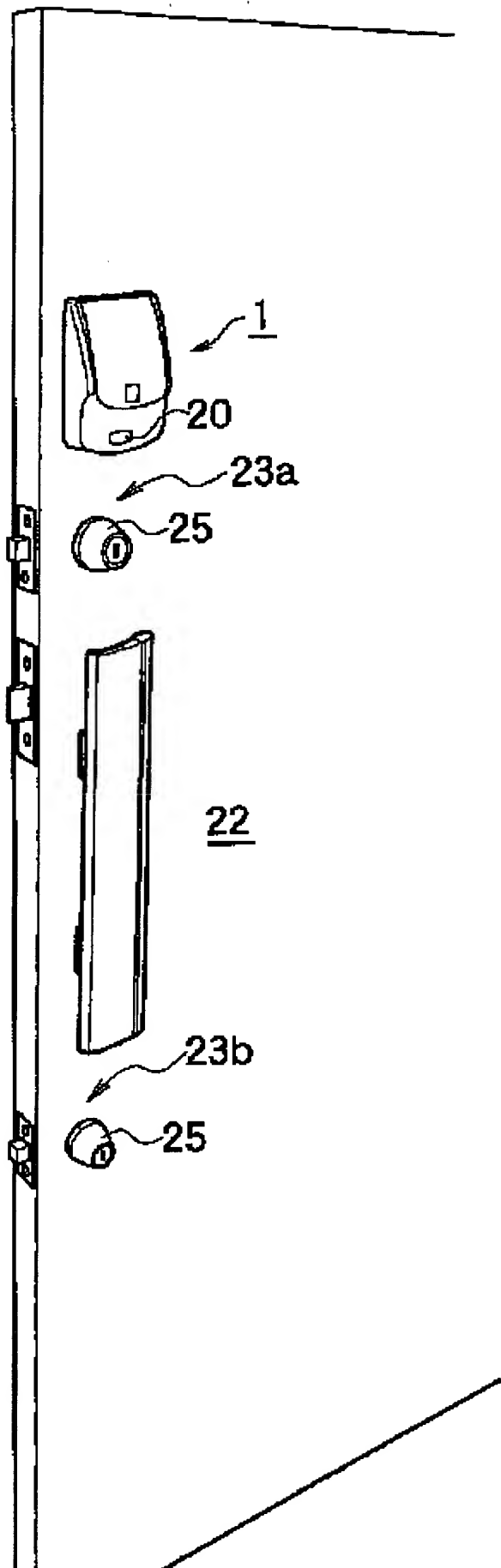
Drawing selection drawing 1

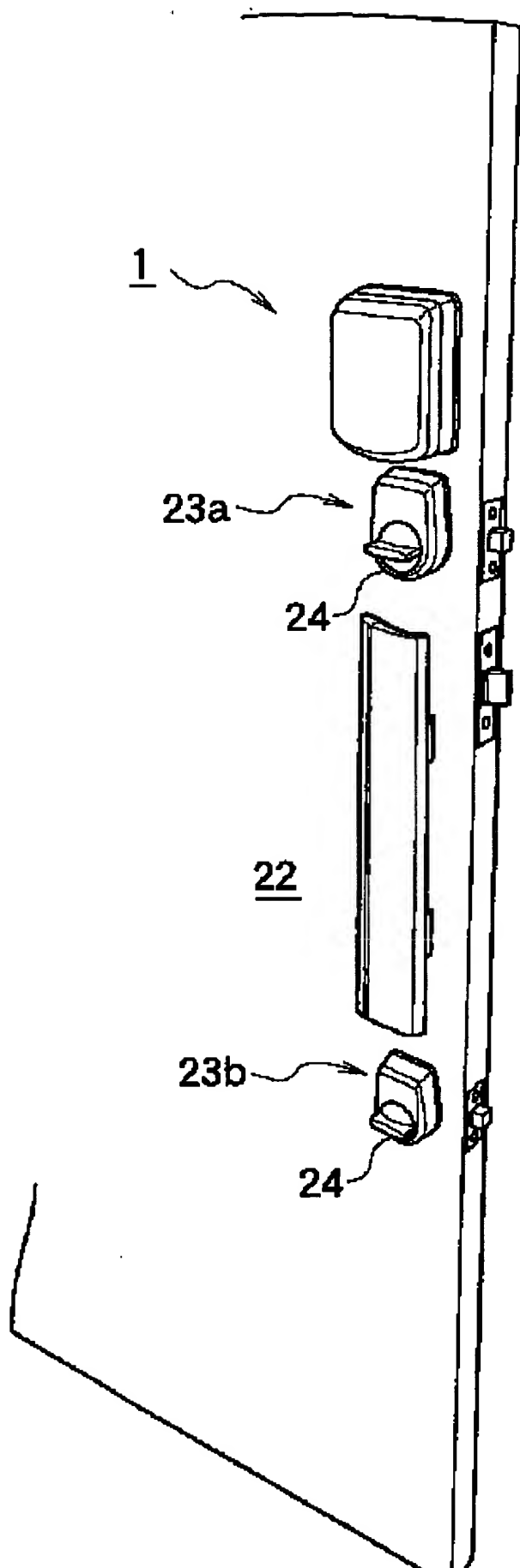


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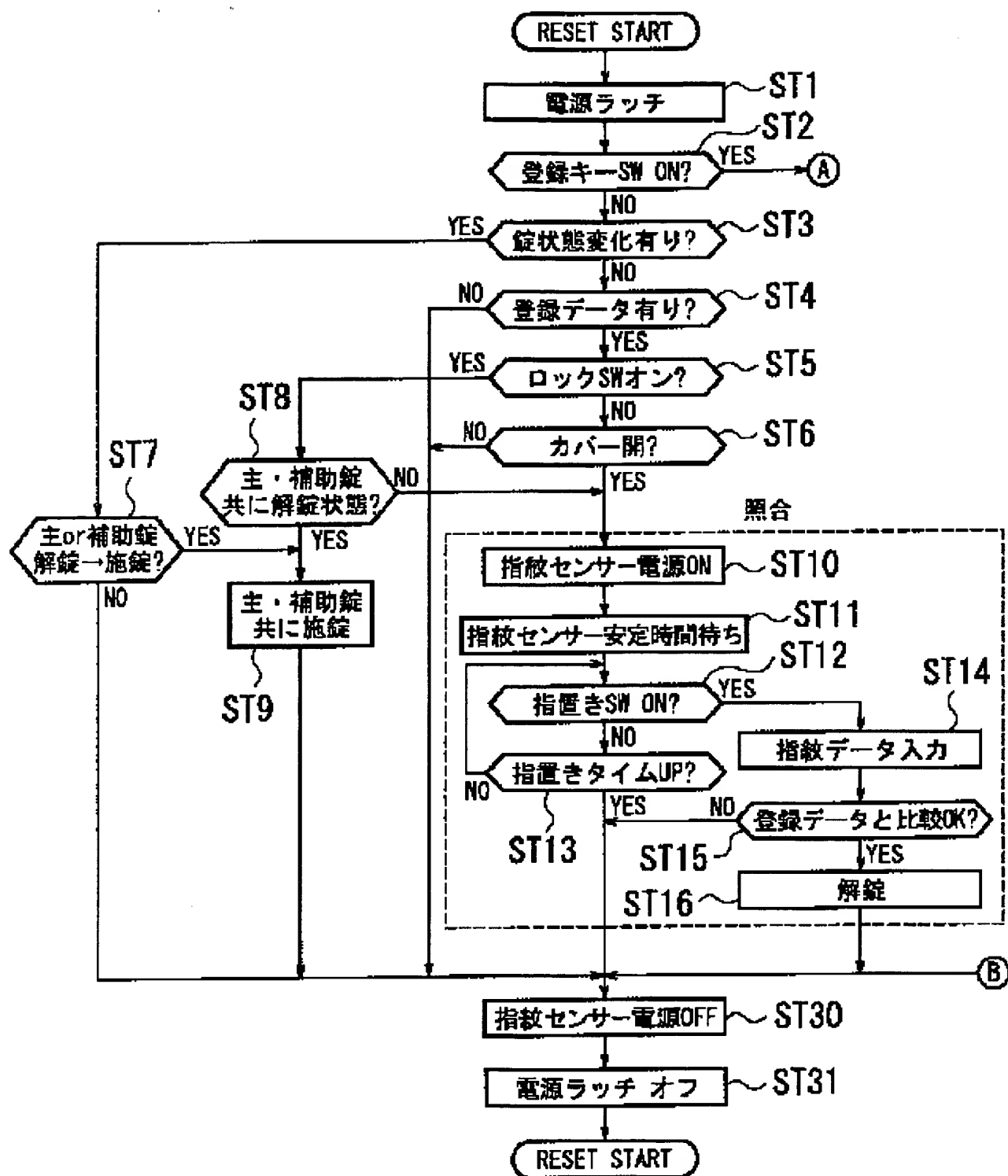


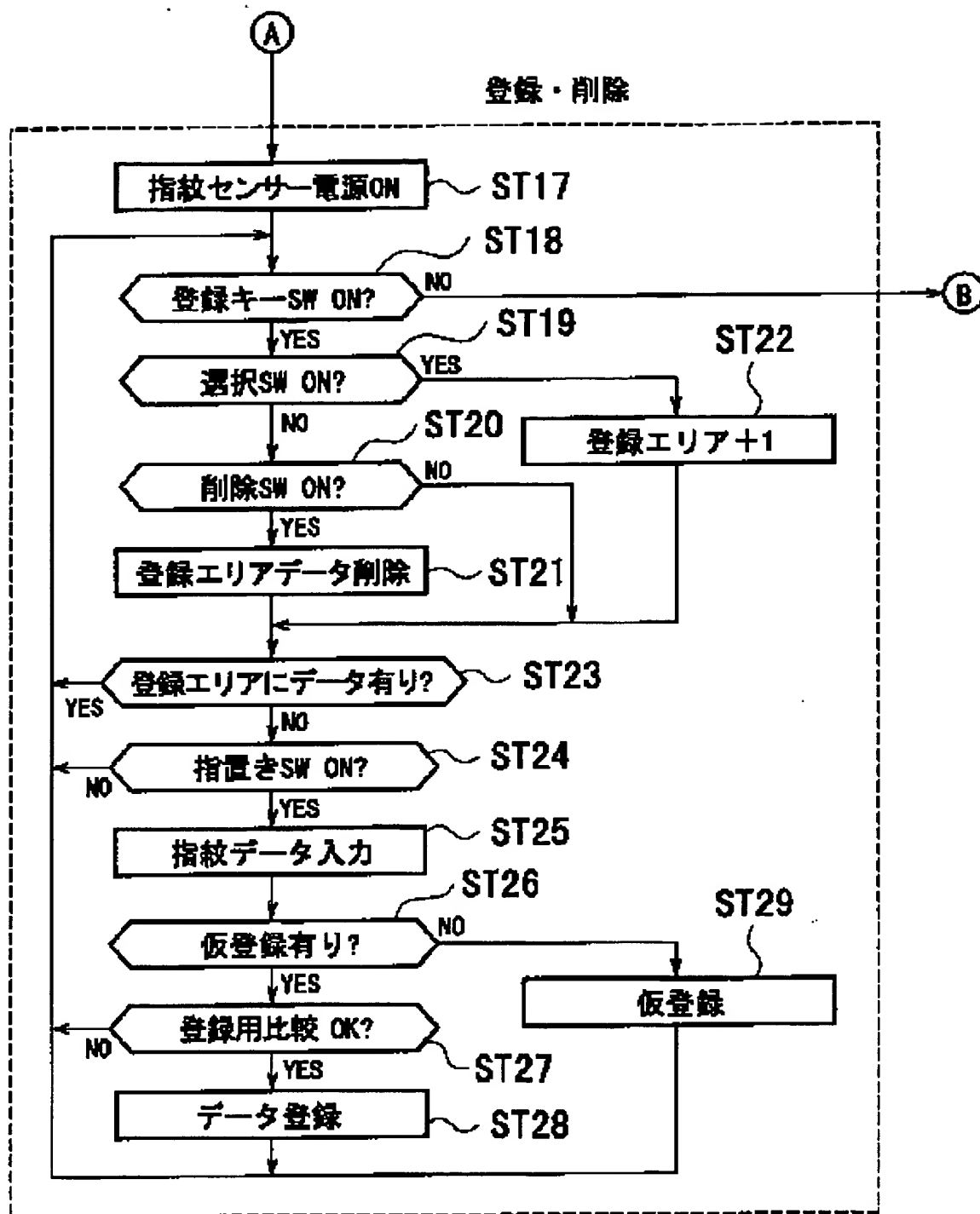












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DETAILED DESCRIPTION

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[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention collates an entrance person's fingerprint, and when in agreement with the fingerprint data registered beforehand, it relates to the fingerprint lock controlled to unlock the electric lock installed in the door.

[0002]

[Description of the Prior Art] Generally, in the apartment or the single house, in order to lock a door or other doors, various kinds of keys are used. However, in the door of the type locked with a key, since actuation of using a key, and locking and unlocking it is required in case people go in and out, a resident always has to walk around with a key at the time of going out. Moreover, a door cannot be unlocked when a key is lost. Moreover, the wire etc. was inserted in the keyhole, the technique of wrenching a key open by the unjust approach is circulated, and there was a possibility that the others might invade in a dwelling, using such an approach.

[0003] Then, in order to solve such a problem, when register a resident's fingerprint beforehand, a fingerprint is inputted at the time of unlocking, these are collated and coincidence is checked, the fingerprint lock which unlocks an electric lock is proposed and practical use is presented. Since there is no fear of a resident not having the need of walking around with a key, by using such an approach, and a key being wrenched open, it is very useful on crime prevention.

[0004] As a conventional example of such a fingerprint lock, what was indicated by JP,10-184130,A (henceforth the conventional example) is known. If the fingerprint lock indicated by this conventional example lays an entrance person's fingertip in the detection aperture carried in the fingerprint authentication machine installed in the outside of a door and the depression of the fingertip is turned down in this condition, the switch of a camera serves as ON and it has the configuration by which the fingerprint of a fingertip is picturized. And when the picturized fingerprint and the fingerprint data registered beforehand are collated and these coincidence is checked, it is constituted so that an electric lock may be unlocked.

[0005] However, since the switch of a fingerprint collation device is thrown in when an entrance person lays a fingertip in a detection aperture and pushes this detection aperture, if the warm-up time of a camera is taken into consideration, the time amount for about 2 - 3 seconds will be taken [ after laying a fingertip ] to complete the image pick-up of a fingerprint to the fingerprint lock indicated by such conventional example. That is, an entrance person has to continue placing a finger for 2 - 3 seconds on a detection aperture, and has troublesomeness.

[0006] So, when predetermined power is needed and the dry cell is especially used as a power source although it is feeble in order to maintain a warm-up condition by such approach, although how to always change a fingerprint collation device into a warm-up condition, and to stand by can be considered in order to solve this problem, the problem that the life of a cell becomes short occurs.

[0007] Moreover, although how to shorten the time amount which lays a finger as lays a finger in a detection aperture is also considered after installing the switch for powering on in the fingerprint

collation device, and an entrance person's once switching on [ this ] and carrying out the warm up of the camera Since actuation of laying a finger on a detection aperture needs two actuation once it pushes a switch, an entrance person's troublesomeness is still uncanceled.

[0008]

[Problem(s) to be Solved by the Invention] As mentioned above, an entrance person's fingerprint was detected by the fingerprint lock in the former, and since the fingertip had to be laid on the detection aperture about 2 to 3 seconds at the time of the fingerprint authentication of what can cancel the trouble of walking around with a key since an electric lock can be unlocked when in agreement with the fingerprint with which the detected fingerprint was registered, there was a fault that actuation was troublesome.

[0009] This invention is a series of actuation by the entrance person, and the place which it is made in order to solve such a conventional technical problem, and is made into that purpose can make a camera a warm-up condition, and it is to offer the fingerprint lock which can picturize an entrance person's fingerprint in a short time.

[0010]

[Means for Solving the Problem] In order to attain the above-mentioned purpose, invention of a publication to this application claim 1 In the fingerprint lock which unlocks the electric lock formed in the door when an entrance person's fingerprint and the fingerprint registered beforehand are in agreement A fingerprint detection means by which an image pick-up means to picturize the fingerprint of the fingertip put on the detection aperture which is installed in the outside of said door and lays said entrance person's fingertip, and this detection aperture was provided, A fingerprint data storage means to memorize the fingerprint data registered beforehand, and the fingerprint data detected with said fingerprint detection means, The registered fingerprint data are collated and it has the control means which unlocks said electric lock when coincidence is checked. Said fingerprint detection means Furthermore, when what the switching means which detects what wrap covering and this covering opened said detection aperture for possible [ closing motion ] was carried, and covering opened in said switching means is detected, it is the description to switch on the power source of said fingerprint detection means.

[0011] In invention according to claim 2, said covering has a hinge region, revolution is made possible centering on this hinge region, and said switching means is characterized by being the mechanical switch formed near said hinge region.

[0012] It is characterized by enabling the press of said fingerprint detection means caudad, and installing a finger presser-foot switch under this fingerprint detection means, detecting that this finger presser-foot switch was thrown in, and invention according to claim 3 starting the image pick-up by said image pick-up means.

[0013] Invention according to claim 4 has a lock switch for locking said electric lock from the outside of said door, and said control means is characterized by controlling in order to switch on the power source of said fingerprint detection means, when the electric lock is locked and a lock switch is thrown in.

[0014]

[Embodiment of the Invention] Hereafter, the operation gestalt of this invention is explained based on a drawing. Drawing 1 is the block diagram showing the configuration of the fingerprint lock concerning 1 operation gestalt of this invention. As shown in this drawing, this fingerprint lock 1 has the memory (fingerprint data storage means) 3 which memorizes CPU (control means)2 used as a control center, and the registered fingerprint data, is arranged on the controller 6 arranged inside a door, and the outside of a door, and possesses the fingerprint input unit 7 which detects an entrance person's fingerprint. As for the controller 6, supply voltage is supplied from the dry cell 5. In addition, it is also possible to use DC power supplies other than dry-cell 5.

[0015] Furthermore, the registration key switch 8 used in case fingerprint data are registered, the selecting switch 10 which chooses the registration area number of the fingerprint data set as memory 3, the deletion switch 9, and the display 4 are provided.

[0016] CPU2 collates the fingerprint data obtained from the fingerprint input unit 7, and the registration

data beforehand registered into memory 3, and possesses fingerprint authentication section 2a which detects the coincidence and an inequality, and electric lock control-section 2b which controls locking of two electric locks 23 (main lock 23a, auxiliary-lock 23b) formed in the door, and unlocking.

[0017] The front view in which drawing 2 shows the appearance of the fingerprint input unit 7, and drawing 3 are the cross-sectional views of the fingerprint lock 1. As shown in drawing 2 and drawing 3 R> 3, the fingerprint input unit 7 has the fingerprint sensor (fingerprint detection means) 15 which consists of a camera (image pick-up means) 14 for picturizing the fingerprint of the fingertip laid on the detection aperture 11 which lays an entrance person's fingertip, and this detection aperture 11, and covering 13 is further arranged so that the upper part of the detection aperture 11 may be covered. And since revolution of covering 13 in the vertical direction is enabled with the hinge 12, the part of the detection aperture 11 can be opened [ covering ] and closed by making it circle in this covering 13.

[0018] Covering 13 is made as [ fix / in the condition of having circled to the up side ], if it is made to circle up and the predetermined dead point is exceeded. Furthermore, near the hinge 12, when covering 13 is opened, the covering switch (switching means) 19 set to ON is attached (namely, when it circles up).

[0019] Moreover, as shown in drawing 3 , the switch 16 is arranged every finger at the lower part of the fingerprint sensor 15, and contact 16a of a switch 16 is in contact with the inferior surface of tongue of the fingerprint sensor 15 this every finger. And the fingerprint sensor 15 is energized in the direction which occurs up by using a hinge 17 as the supporting point according to the elastic force of contact 16a. Therefore, if an entrance person lays a fingertip on the detection aperture 11 and does the depression of the fingerprint sensor 15 caudad in this condition, a switch 16 will serve as ON every finger.

[0020] Moreover, the lock button 20 is installed in the front-face side lower part of the fingerprint input unit 7, and by pushing this lock button 20, it is constituted so that a lock switch 21 may serve as ON.

[0021] And the injection signal of a switch 16, the covering switch 19, and a lock switch 21 is supplied to CPU2 ( drawing 1 R> 1) of the controller 6 arranged inside a door 22 every finger.

[0022] A perspective view when drawing 4 looks at a door 22 from an outside, and drawing 5 are the perspective views when seeing a door 22 from the inside, and the electric lock 23 (main lock 23a, auxiliary-lock 23b) is installed in two places of the fingerprint lock 1 bottom like illustration. Each electric lock 23 (23a, 23b) has the thumb turn 24 arranged inside a door 22, and the mechanical cylinder lock 25 arranged on the outside of a door 22. And when the electric lock 23 (23a, 23b) is in a unlocking condition, it can lock by operating a thumb turn 24 by the inside of a door 22, or pushing a lock button 20 on the outside of a door 22. Moreover, when the electric lock 23 is in a locking condition, a thumb turn 24 is operated by the inside of a door 22, the mechanical cylinder lock 25 of the outside of a door 22 is operated using the key of dedication or coincidence with an entrance person's fingerprint and the registered fingerprint is checked by the fingerprint lock 1, it can unlock.

[0023] Drawing 6 and drawing 7 are flow charts which show the procedure by CPU2 shown in drawing 1 , and they explain an operation of this operation gestalt, referring to this flow chart below.

[0024] If an electrical potential difference is supplied from a dry cell 5 (step ST 1), it will be judged whether the registration key switch 8 was set to ON (step ST 2). And when the registration key switch 8 is set to ON, it shifts to processing of registration and deletion of YES) and fingerprint data in (step ST2.

[0025] In this processing, first, the power source of the fingerprint sensor 15 is set to ON (step ST 17), and further, since the registration key switch 8 is set to ON (it is YES at a step ST 18), it is judged succeedingly whether the selecting switch 10 is set to ON (step ST 19). And when a selecting switch 10 is set to ON, the increment of the registration area number of the memory 3 for fingerprint data registration is carried out, and it is displayed on a display 4 (step ST 22). Subsequently, when fingerprint data are already registered into the displayed registration area number, YES) and by pushing a selecting switch 10 again, a registration area number is incremented and non-registered registration area is searched with (step ST23.

[0026] When non-registered registration area exists, NO) and a registrant carry a fingertip on the

detection aperture 11 of the fingerprint sensor 15 by (step ST23, and this detection aperture 11 is pressed caudad. Since the fingerprint sensor 15 moves to the bottom a little by this focusing on the hinge 17 shown in drawing 3, contact 16a of a switch 16 is turned on every finger (step ST 24). In response to this signal, a camera 14 performs processing which picturizes the fingerprint of the fingertip laid on the detection aperture 11 (step ST 25).

[0027] And it is judged whether the temporary registration data about this register operation exist (step ST 26). When temporary registration data do not exist, it considers as NO) and the picturized fingerprint data temporary registration data by (step ST26 (step ST 29), and the processing from a step ST 18 is repeated again, and fingerprint entry-of-data processing is performed. Subsequently, since it is checked by processing of a step ST 26 that temporary registration data exist Temporary registration data (fingerprint data inputted into the 1st time) are compared with the fingerprint data inputted into the 2nd time (step ST 27). When both coincidence is checked, YES) and this fingerprint data are made to correspond to the selected registration area number by (step ST27, and processing which memorizes in memory 3 is performed (step ST 28).

[0028] Moreover, the fingerprint data memorized by processing of steps ST20 and ST21 by the registration area number for which it asks can be deleted to delete the fingerprint data registered. In addition, when the registration key switch 8 is turned on and fingerprint data are registered into all registration area, after not setting the power source of the fingerprint sensor 15 to ON but deleting registration area data, it is good also as ON.

[0029] On the other hand, by processing of a step ST 2, it is judged whether when the registration key switch 8 is not set to ON, the condition of the electric lock 23 (main lock 23a, auxiliary-lock 23b) has change (step ST 3), and when it is judged that it is changeful, it is judged whether YES) and one of the electric locks 23 was changed from the unlocking condition to the locking condition by (step ST3 (step ST 7).

[0030] And when [ both ] it changes from a unlocking condition to a locking condition, YES) and two electric locks 23 are made into a locking condition by (step ST7 (step ST 9). That is, when only main lock 23a is locked, this is interlocked with and auxiliary-lock 23b is locked, and similarly, when only auxiliary-lock 23b is locked, it operates so that this may be interlocked with and main lock 23a may be locked.

[0031] When change will be in the condition of the electric lock 23, it is judged whether the fingerprint data registered into NO) and memory 3 by (step ST3 exist (step ST 4), and when fingerprint data are registered, it is judged whether YES) and a lock switch 21 were set to ON by (step ST4 (step ST 5). And when [ both ] a lock switch 21 is set to ON, it is judged whether YES) and main lock 23a and auxiliary-lock 23b are in a unlocking condition in (step ST5 (step ST 8), and in being in both unlocking conditions, it makes YES) and these into a locking condition by (step ST8 (step ST 9).

[0032] Moreover, when the covering switch 19 is set to ON in the condition that a lock switch 21 is off, or when a lock switch 21 is set to ON and either main lock 23a or auxiliary-lock 23b is locked (it is NO at a step ST 8), it shifts to the actuation which collates a fingerprint.

[0033] Namely, this fingerprint sensor 15 is first made into a standby condition by setting the power source of the fingerprint sensor 15 to ON (step ST 10). Subsequently, after time amount until actuation of the fingerprint input sensor 15 is stabilized passes (step ST 11), it is judged whether the switch 16 was set to ON every finger (step ST 12). Here, since a switch 16 serves as ON NO) and every finger by (step ST13 when an entrance person lays a fingertip on the detection aperture 11 and presses this detection aperture 11 caudad within a time every finger (it is YES at a step ST 12), processing which picturizes the fingerprint of a fingertip is performed by the camera 14 (step ST 14). And processing which compares the picturized fingerprint data with the fingerprint data beforehand registered into memory 3 is performed (step ST 15), and when coincidence is checked, YES) and two electric locks 23 are unlocked by (step ST15 (step ST 16). Then, the power source of the fingerprint sensor 15 is made off (step ST 30), and a power-source latch is made off (step ST 31). moreover -- the case where coincidence with fingerprint data and registration data is not checked -- (-- a step ST 15 -- NO) -- it does not unlock.

[0034] In this way, processing of registration of fingerprint data, processing of deletion, the processing

that collates the inputted fingerprint data and locking of the electric lock 23, and unlocking is performed. and by the fingerprint lock 1 of this operation gestalt, when a lock switch 21 is set to ON Since the power source of the fingerprint sensor 15 serves as ON and this fingerprint sensor 15 will be in a standby condition when covering 13 circles up and the covering switch 19 is set to ON, an entrance person If a fingertip is laid on the detection aperture 11 and a switch 16 is set to ON every finger, a fingerprint entry of data will be performed immediately.

[0035] Therefore, since an entrance person does not have the need of continuing laying a fingertip on the detection aperture 11 for a long time, he can simplify the collation operation of a fingerprint.

[0036] After a power source is set to ON, the warm-up time for about about 2 - 3 seconds is required for the fingerprint sensor 15. Namely, by the fingerprint lock 1 of this operation gestalt Since an entrance person performs actuation of surely opening covering 13 before inputting a fingerprint By the covering switch's 19 being interlocked with and setting the power source of the fingerprint sensor 15 to ON, the warm up will be completed at the time of a fingerprint input (after opening covering 13 before putting a fingertip on the detection aperture 11, the time amount for about 2 - 3 seconds passes). Therefore, since fingerprint data are immediately picturized after an entrance person lays a fingertip on the detection aperture 11, making an entrance person sense troublesomeness is lost.

[0037] Moreover, since a power source can be set to ON by pushing a lock button 20 when the power source of the fingerprint sensor 15 does not serve as ON, even if the covering switch 19 breaks down and it opens covering 13, a fingerprint can be inputted such even case.

[0038] In addition, although what consisted of these operation gestalten so that it might circle up and down and the part of the detection aperture 11 might be covered as covering 13 was explained to the example, this invention is not limited to this and can use covering constituted so that it might open to right and left.

[0039]

[Effect of the Invention] By the fingerprint lock concerning this invention, as explained above, since the power source of a fingerprint detection means is set to ON when an entrance person opens covering, when a fingertip is laid in a detection aperture, it will be in the condition that the warm up of an image pick-up means was already completed, and a fingerprint can be picturized immediately. Thereby, an entrance person can input a fingerprint without sense of incongruity by a series of actuation, and the fault of being kept waiting for a long time (time amount for 2 - 3 seconds) where a fingertip is laid can be canceled.

[0040] Moreover, since the power source of a fingerprint detection means can be set to ON by pushing a lock switch, after covering had opened, when it was left, or when a covering switch (switching means) breaks down, a fingerprint can be inputted certainly.

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[Translation done.]